



Interview by Peter Edwards, Global Gypsum Magazine

## Now: 100% wallboard recycling with Gypsum Recycling International

Gypsum Recycling International (GRI) is a Danish wallboard recycling company that traces its roots back to 1999. The company, now headed by CEO Henrik Lund-Nielsen, has expanded into other northern European markets over the years by taking its patented mobile gypsum recycling machines into an increasing number of countries. Here Lund-Nielsen describes GRI's business model, its technical abilities and its frustrations with the legislative environment in the EU. He also announces a new patent-pending technology for recycling the paper content of wallboard into fresh paper 'raw' material. This represents 100% gypsum wallboard recycling, a first for the gypsum recycling sector.



**Above:** Henrik Lund-Nielsen went from being a corporate trouble-shooter to gypsum recycler in 2003.

**Global Gypsum (GG):** Could you give our readers a brief background to your career prior to your involvement with gypsum recycling?

**Henrik Lund-Nielsen (HLN):** I had a varied career across a number of different types of companies including blind and office furniture manufacturers. I became the CEO of an office furniture subsidiary at 28, where I was able to turn around a very difficult financial situation.

After that, I became known as a bit of a 'trouble-shooter.' When a subsidiary company saw bad results, I would move in and try to turn things around. Later on, I became the CEO of Faber Blinds, which is owned by Velux. It had 1000 employees at that time.

**GG:** How did you get into gypsum recycling?

**HLN:** I ran into an entrepreneur from Denmark called Karsten Rasmussen. He was in the demolition sector and if you are in demolition in Scandinavia, you are a recycler. Almost all used building materials have to be recycled. One of the fractions that he could not recycle was gypsum wallboard and that annoyed him like crazy because he had to send it to expensive landfills.

He had been to Knauf and asked, if he could recycle old wallboard into fresh gypsum, would Knauf be interested? Knauf said that it had been trying to recycle old boards with various contaminants in vain for 25 years. It said that it would welcome any recycled gypsum that he could supply.

With that customer base Karsten started investing and experimenting in 1999, spending something like Euro1.5m. After 30 months and a lot of trials, errors and mistakes, he managed to recycle gypsum from wallboard and he launched the company in 2001.

When I ran into Karsten it was 2003 and he was in the process of going bankrupt. He had only 30-40 customers but crucially had a proof of concept in that he had a machine and a wallboard plant receiving recycled material. I provided half the money that he needed to keep going and became chairman of the board. I was able to help him internationally because I spoke foreign languages and he, unusually for a Dane, could not. I agreed to help him out for a six month trial period and when that proved successful internationally I committed to the position of CEO full-time. I gave up my corporate career to move to a less secure life as an entrepreneur but I believed in the international potential of the company and had the vision to grow it. Today Karsten has sold his shares and I own the company with two other people.

**GRI's growth**

**GG:** How has Gypsum Recycling International (GRI) grown since the early days and what has driven its growth?

**HLN:** The EU Directive passed in 2002 said that by 2005 all of the EU Member States would have to change how they dealt with used gypsum wallboard. If they were landfilling, they would have to use separate cells. I could see in 2003 that, if properly implemented, this would increase the cost of disposal massively and make recycling a much more viable option for gypsum wallboard.

In 2003-2004 we had a strategy to be the first mover in this market, moving into as many countries as possible, as quickly as possible. In 2003 we moved into Sweden, in 2004 we moved into the Netherlands and Norway and in 2005 we moved into the UK and Ireland. The idea was to be there, ready and waiting for material when the law came into effect.

Now, 10 years later, only two countries have implemented the EU Directive correctly. The two that have, Denmark and Sweden, were forced to do so but



only after GRI took exception to the way things were being done in those countries.

Sadly, the vision of GRI having 500 employees within five years of the EU Directive being implemented was not possible. Today we only have 25-30 employees. However, this isn't necessarily a 'problem' *per se* as it's a sign that we are running a very labour-efficient system. In Sweden and Norway we have 50% of the gypsum recycling market but just two staff members. Today we have over 1000 customers so there has been significant expansion since 2003.



## Methodology

**GG: Can you explain the process used by GRI?**

**HLN:** We use three mobile gypsum recycling plants in Europe. One is in northern Holland and will go to Norway next week. Another is in Norway at the moment and the other is in Denmark. We also sold a recycling unit to a recycler in the USA and one to a Japanese recycler, so our technology is used around the world.

The logic behind the machines being mobile is that it is cheaper to move the machine than move the waste. Instead of making one facility for Denmark and transporting all of the material there, we can go directly to the customer. We have collection warehouses close to the wallboard plants because that is where the recycled gypsum needs to go to in the end. This mobility is especially important in Scandinavia, particularly Sweden and Norway, which both have relatively little waste and are actually quite massive places. There is the added advantage that we can roll out in a new country at no additional investment.

If we move the machine from Holland to Sweden, it costs around Euro6000. However, transporting the waste a similar distance could cost Euro10-30/t. If the machine processes 2500t in 10 days in Sweden, the cost of moving the machine pales into a few Euros!

**GG: How much capacity does the company have?**

**HLN:** We have an annual capacity of several hundred thousand tonnes.

**GG: Who are GRI's typical customer and how are they changing over the years?**

**HLN:** A typical customer has around 100t/yr of wallboard waste and they fit into three categories: civic amenity sites, construction/demolition sites and waste-sorting facilities. Over the years we are seeing a gradual drift to more construction sites as customers because they are increasingly sorting their own wastes on site. It's not a big trend but it is noticeable.

## Inside the magic box

**GG: Can you tell us how the machines work?**

**HLN:** Inside the machines, each relatively small piece of wallboard is put under pressure and squeezed. This pulverises the gypsum into a powder but the paper remains intact. After this process it is very easy to separate the large pieces of paper from the small pieces of gypsum and we gain the gypsum as a powder.

Anything that is not part of the wallboard, for example mineral wool, paint, bricks, cement, nails and other contaminant, is removed by the machine. This venture was set up by a demolition expert after all, so he designed machines that could handle these kinds of contaminants.

**GG: Are there any problems with additives contaminating the new boards that are made?**

**HLN:** No, there are no problems with latent additives when our recycled product is used in new boards. Indeed, we have testimonials from the most progressive plants that show how they use 30% recycled gypsum in new board. Unofficially they confirm that we could go to 100%, but no plant has been able to do it yet because we cannot supply all of that material.

## Wallboard liner recycling and the PRU

**GG: Does the paper find a use?**

**HLN:** Yes. Previously we used it for recovery-type operations, for example in barns or composting. However, we have filed a patent for a very advanced machine called a Paper Recycling Unit (PRU). This means that we can make the paper into a paper raw material. The paper that we recovered before was

**Left:** GRI's footprint is strongly based in northern Europe. Its machines are also used by other recyclers in the USA and Japan.

**Below:** One of GRI's waste collection trucks out on the road.





really paper that was full of gypsum, plastic and insulation materials. That ‘paper’ was not really paper. It could have as much as 45% contaminants and as such was not suitable for making new paper.

Since the implementation of this technology over the summer, we can recycle 100% of the wallboard waste we receive. Around 94% is gypsum and 6% is pure paper as a raw material that goes straight back to the paper mill. This means that we create two raw material streams – one gypsum, one paper. No other gypsum recycler is able to do that at the moment so it represents a major step change. The project has been co-funded by the Eco-innovation Initiative of the European Union.

**Right:** GRI has developed the PRU. It applied for the patent in June 2014.

**GG:** Is the PRU now retrofitted onto the existing machines?

**HLN:** No, the PRU is as big as the existing machines. The concept is that, first, the gypsum recycling machine comes in and processes the wallboard. It leaves the materials in the warehouse where it processed the wallboard, as it does today. Then the PRU comes in and processes the paper that is left in the warehouse.

We will try to put the paper raw material back into plasterboard liner (PBL) but there are not many PBL producers left in Europe now. We really want to put it back into PBL because it would make two beautiful recycling loops.

**Below:** With GRI’s new patent-pending PRU unit, the company is able to supply two raw material streams from waste gypsum wallboard: gypsum and recycled paper material. This schematic shows the possibilities of using the paper material in PBL. With this system 100% recycling of gypsum wallboard becomes possible.



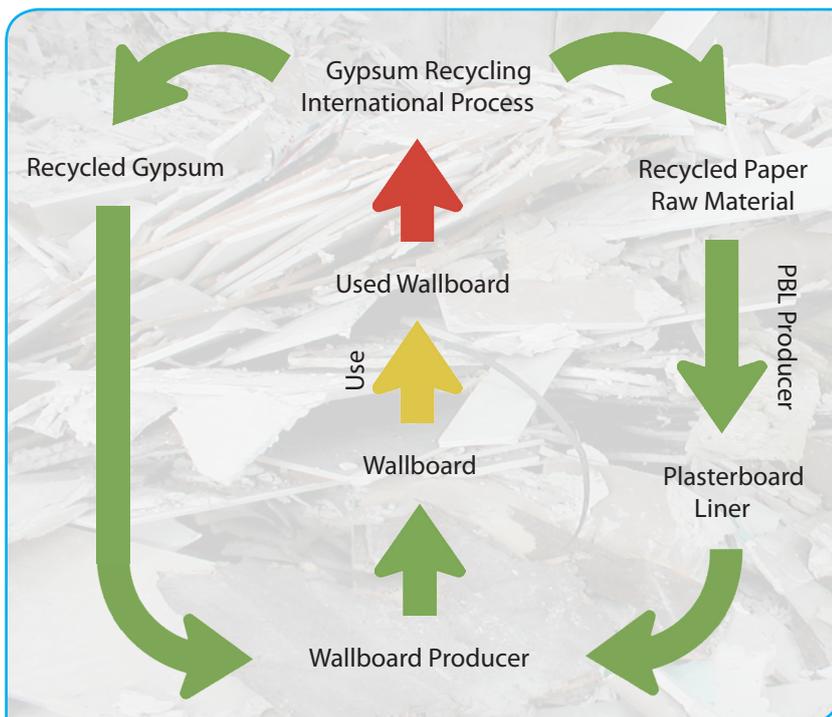
## Legislation and ‘phoney’ firms

**GG:** You alluded earlier to poor implementation of the EU Directives. Can you elaborate?

**HLN:** The poor implementation of the EU Directives by EU Member States is where governments fail to correctly implement the Directives that they should have implemented years ago. In addition, we also see governments that fail to check the voracity of the recycler’s claims, which allows phoney recyclers to get a foothold in the market. Don’t get me wrong, we welcome honest competition but there are a lot of phoney companies out there.

**GG:** What are the phoney companies really up to?

**HLN:** They claim that gypsum waste can be used for new gypsum products, be put into cement or used for a variety of agricultural applications but they just throw everything out onto farmland. What about the contaminants? What about the nails and the screws? What about the plastics? What about the fact that gypsum is ~30% sulphur, which will leak into ground water and contaminate the soil? We have the perverse situation that the same waste that was ‘too dangerous’ to go into normal landfill





*“We should be enforcing the EU Directives that we have, not adding more to the pile of legislation that is ignored by national governments!”*



cells is now being liberally scattered onto farmland. That's why we pulled out of the UK, despite the fact that we were charging Euro40-45/t, half the cost of landfill. The phoney recyclers were charging just Euro25/t and there was no way that we could stay.

It is allowing 'recycling' approaches like this across the EU that prevents the proper implementation of the EU Directive and is one of the reasons that we do not have 10 machines and 500 employees. Thankfully the UK government now sees that it is having problems. They are seeing the first environmental problems developing, which will hopefully drive changes.

I'm also critical of the implementation of the EU Directives in Germany. In Germany, there are landfills that are operated according to the EU Landfill Directive. However, there are also de-facto landfills. For example, an operator digs a big hole to 'extract clay.' Then it announces to the authorities that it has a problem. It needs some material, perhaps gypsum wallboard waste, to fill in this hole and replace the surface of the land. Anywhere else this is quite clearly a landfilling operation but German regulations denote this behaviour as a 'recovery' operation and does not regulate it according to the EU Landfill Directive.

**GG: How much recycled gypsum are boardmakers using in the markets that GRI operates in?**

**HLN:** In Denmark it's around 25% of their total gypsum raw material consumption. All of our Scandinavian customers are using 20-30%. We also know how much of that is supplied by us. I don't particularly want to expand about other markets.

**Towards greater recovery by GRI**

**GG: Which of the markets are the most forward**

**thinking in terms of gypsum recycling and where is there room for improvement?**

**HLN:** Norway is the most forward-thinking because it can afford to implement processes thoroughly and Finland is improving. Both of those countries realised that they were behind in general recycling terms compared to Denmark and Sweden and made a push to improve on all fronts. Now Norway has surpassed Denmark and Sweden.

On the negative side, don't look to the south or east in Europe if you don't want nightmares! There is virtually no construction and demolition recycling in any of those markets. At least there is only one way to go from 0%. I have already covered the fact that in my opinion Germany and the UK are not performing well.

**GG: Are there any plans to expand GRI's capacity at the moment?**

**HLN:** Not at present. However, we are moving into more countries. We have only collected material in Finland to date so we will process for the first time there soon. Our move into Finland will also include using another gypsum recycling machine there because the country is so vast.

We will also start to focus more on the Netherlands because changes to its domestic recycling laws will effectively close the border to Germany for 'gypsum recovery' operations. It has upgraded its minimum post-use requirements for wallboard from 'recovery' to 'recycling.' We will watch developments closely and take advantage of the expected changes.

**GG: What one thing would you change in a best-case scenario that would most benefit the gypsum recycling sector in the EU?**

**HLN:** I would make sure that the existing EU Directives were implemented completely through the whole of Europe. This is possible through increased public awareness and awareness among policy makers. The problem with EU lawmaking is that lawmakers think that, once they have passed a Directive, it is automatically implemented out in the industry. However, in the real world a Directive is just the start. A lot more needs to happen. We say that we should enforce the existing regulations instead of inventing new ones. If the basic Directives didn't get implemented, how can we implement the more difficult ones? We should be properly enforcing the policies and Directives that we have, not adding more to the pile that is ignored by national governments.

**GG: Thank you very much for your time.**

**HLN:** You are very welcome!



**Below:** A one-trailer GRI mobile gypsum recycling machine.

